

REMARKS

Applicants request favorable reconsideration and withdrawal of the rejections set forth in the outstanding Office Action in view of the preceding amendments and the following remarks.

Claims 22-26 are presented for consideration, with claim 22 being the sole independent claim. By this amendment, claims 2, 3, 5, and 10-21 have been canceled without prejudice or disclaimer, and claims 22-26 have been added. Support for the new claims can be found in the original application, as filed. No new matter has been added.

In the Office Action, claims 2, 3, 5, and 10-21 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. In particular, the Office Action objected to the phrase, “wherein at least one surface of said sagittal asymmetric change surfaces has an inflection point on one side of the optical axis in the meridional direction.” Without conceding the propriety of this rejection, claims 2, 3, 5 and 10-21 have been cancelled, and the newly added claims do not include this feature. Accordingly, Applicants submit that this rejection is now moot.

Also in the Office Action, claims 12 and 13 were rejected under 35 U.S.C. § 112, second paragraph, as indefinite. Claims 12 and 13 have been canceled by this amendment. Accordingly, this rejection is believed to be moot.

Regarding art rejections, claims 2, 3, 5, and 10-21, stand rejected under 35 U.S.C. § 102 as anticipated by U.S. Patent No. 5,774,249 to Shiraishi et al. Applicant submits that these rejections are moot in view of the cancellation of claims 2, 3, 5, and 10-21. In addition,

Applicant submits that Shiraishi et al. fails to teach or suggest features of the present invention, as recited in new claims 22-26.

In an aspect of the invention, as recited in claim 22, an optical scanning apparatus includes light source means, a rotary polygon mirror for reflecting and deflecting a light beam emitted from the light source means, entrance optical means for guiding the light beam emitted from the light source means to the rotary polygon mirror, and imaging optical means for forming an image of the light beam reflectively deflected by the rotary polygon mirror on a surface to be scanned. In a main scanning section, the light beam enters onto a deflection surface of the rotary polygon mirror with a predetermined inclination angle which is formed between a direction of the light beam entering onto the deflection surface and an optical axis of the imaging optical means. The imaging optical means has a plurality of asymmetric change surfaces each of which has a curvature in a sub-scanning direction that changes asymmetrically in a main scanning direction, assuming the optical axis of the imaging optical means as a center. In the plurality of asymmetric change surfaces, a curvature of a surface located at a side with respect to the optical axis of said imaging optical means where an optical path of the light beam entering onto the deflection surface of the rotary polygon mirror with the predetermined inclination angle exists is larger in a whole of an effective scanning region than a curvature of a surface located at a side with respect to the optical axis of the imaging optical means, where an optical path of the light beam entering onto the deflection surface of the rotary polygon mirror with the predetermined inclination angle does not exist.

In an optical scanning apparatus such as that shown in Figure 1, for example, varying travel distances of light beams reflectively deflected by a polygon mirror cause problems

such as asymmetry of an imaging position (curvature of field) in a sub-scanning direction and asymmetry of magnification in the sub-scanning direction. In particular, as can be seen in Figure 1, light beams are incident on a polygon mirror 5 at an inclination angle. Because of the inclination angle, a beam that strikes the polygon mirror on a side of the optical axis at which the beam enters the polygon mirror (i.e., above the optical axis in Figure 1) travels farther to the surface to be scanned than a beam that strikes the polygon mirror on an opposite side of the optical axis (i.e., below the optical axis in Figure 1). This difference in distance results in asymmetry of an imaging position (curvature of field) in a sub-scanning direction and asymmetry of magnification in the sub-scanning direction

As an exemplary application, the present invention remedies these problems by featuring in claim 22, *inter alia*, that the curvature of a surface located at a side of the optical axis of the imaging optical means where an optical path of the light beam entering onto the deflection surface of the rotary polygon mirror exists has a larger effective scanning region than a curvature of a surface located at a side of the optical axis of the imaging optical means where an optical path of the light beam entering onto the deflection surface of the rotary polygon mirror does not exist. Support for these features can be found in the original application, as filed, at least at page 27, lines 9-25 and from page 34, line 20, to page 35, line 13, and in Figures 7 and 10.

Shiraishi et al. relates an optical exposer unit. As shown in Figure 2 of that patent, laser beams emitted by laser elements are deflected by a polygon mirror unit 5 to a post-deflection optical system 21 including a first lens 30a and a second lens 30b. As shown in Figures 15, 23, 31, and 39, for example, surfaces of the lenses 30a and 30b have surfaces whose curvature in the sub-scanning direction changes asymmetrically in the main scanning direction.

However, Applicants submit that Shiraishi et al. fails to teach or suggest at least that a curvature of the surface located at a side of the optical axis of the imaging optical means where an optical path of the light beam entering onto the deflection surface of the rotary polygon mirror with the predetermined inclination angle exists has a larger effective scanning region than a curvature of a surface located at a side of the optical axis of the imaging optical means where the optical path of the light beam entering onto the deflection surface of the rotary polygon mirror with the predetermined inclination angle does not exist, as recited in independent claim 22.

For the foregoing reasons, Applicant submits that independent claim 22 is patentable over Shiraishi et al. Favorable consideration of new claim 22 respectfully is requested.

The remaining claims depend from claim 22. Those claims are believed to be allowable by virtue of their dependency, and for reciting other patentable features of the invention. Favorable and independent consideration of the dependent claims are requested.

Applicant submits that this application is in condition for allowance. Favorable consideration and an early Notice of Allowance are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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Michael J. Didas  
Attorney for Applicants  
Registration No. 55,112

FITZPATRICK, CELLA, HARPER & SCINTO  
30 Rockefeller Plaza  
New York, New York 10112-3801  
Facsimile: (212) 218-2200

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